

INTERNATIONAL SEARCH REPORT

Inte. Application No
PCT/JP2004/018095

| A. CLASSIFICATION OF SUBJECT MATTER IPC 7 H01M8/12 H01M4/88 H01M4/94 H01M4/86 | | |
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| According to International Patent Classification (IPC) or to both national classification and IPC | | |
| B. FIELDS SEARCHED Minimum documentation searched (classification system followed by classification symbols) IPC 7 H01M | | |
| Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched | | |
| Electronic data base consulted during the international search (name of data base and, where practical, search terms used) EPO-Internal, PAJ | | |
| C. DOCUMENTS CONSIDERED TO BE RELEVANT | | |
| Category * | Citation of document, with indication, where appropriate, of the relevant passages | Relevant to claim No. |
| X | US 2002/028367 A1 (SAMMES NIGEL ET AL) 7 March 2002 (2002-03-07) | 1,2,20 |
| Y | page 7, paragraph 81 - page 8, paragraph 87 | 3-9, 13-15, 18,19 |
| Y | ----- US 5 753 385 A (JANKOWSKI ET AL) 19 May 1998 (1998-05-19) column 5, lines 19-25 - column 7, lines 12-14 | 3,5 |
| Y | ----- US 6 645 656 B1 (CHEN XIN ET AL) 11 November 2003 (2003-11-11) column 5, lines 17-40; figure 1 | 3,5 |
| Y | ----- US 5 741 406 A (BARNETT ET AL) 21 April 1998 (1998-04-21) column 3, line 59 - column 4, line 12 | 4,5 |
| | ----- -/-- | |
| <input checked="" type="checkbox"/> Further documents are listed in the continuation of box C. <input checked="" type="checkbox"/> Patent family members are listed in annex. | | |
| * Special categories of cited documents : "A" document defining the general state of the art which is not considered to be of particular relevance "E" earlier document but published on or after the International filing date "L" document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified) "O" document referring to an oral disclosure, use, exhibition or other means "P" document published prior to the International filing date but later than the priority date claimed "T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention "X" document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone "Y" document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art. "&" document member of the same patent family | | |
| Date of the actual completion of the international search 14 June 2005 | | Date of mailing of the international search report 28.06.05 |
| Name and mailing address of the ISA European Patent Office, P.B. 5818 Patentlaan 2 NL - 2280 HV Rijswijk Tel. (+31-70) 340-2040, Tx. 31 651 epo nl, Fax: (+31-70) 340-3018 | | Authorized officer Boussard, N |

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| C.(Continuation) DOCUMENTS CONSIDERED TO BE RELEVANT | | |
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| Y | US 4 963 239 A (SHIMAMURA ET AL) 16 October 1990 (1990-10-16) column 2, line 53 - column 3, line 4 ----- | 4,5 |
| Y | US 6 197 167 B1 (TANAKA YOICHIRO) 6 March 2001 (2001-03-06) column 1, lines 55-67 - column 2, lines 7-13 ----- | 4,5 |
| Y | US 5 656 387 A (BARNETT ET AL) 12 August 1997 (1997-08-12) column 3, lines 58-61 ----- | 4,5 |
| Y A | US 6 428 920 B1 (BADDING MICHAEL E ET AL) 6 August 2002 (2002-08-06) column 2, lines 59-64 - column 4, lines 49-60 ----- | 6,8,13, 15 10-12 |
| Y A | US 5 543 239 A (VIRKAR ET AL) 6 August 1996 (1996-08-06) column 2, lines 20-40 - column 3, lines 57-59 ----- | 6,8,13, 15 10-12 |
| Y A | US 6 387 230 B1 (MURPHY OLIVER J ET AL) 14 May 2002 (2002-05-14) column 8, lines 46-51 - column 9, lines 12-15 ----- | 6,7 10-12 |
| Y | PATENT ABSTRACTS OF JAPAN vol. 016, no. 469 (E-1271), 29 September 1992 (1992-09-29) & JP 04 167710 A (KAZUHIKO YAMANOUCI), 15 June 1992 (1992-06-15) abstract ----- | 9 |
| A | EP 1 258 283 A (TOYOTA JIDOSHA KABUSHIKI KAISHA) 20 November 2002 (2002-11-20) column 7, lines 9-20 - column 8, lines 22-25 ----- | 7,10-12 |
| Y | US 2003/059658 A1 (KOHLEH JOACHIM ET AL) 27 March 2003 (2003-03-27) page 1, paragraph 8 ----- | 13,14 |
| A | US 6 066 364 A (BLASS ET AL) 23 May 2000 (2000-05-23) column 1, lines 36-42 - column 2, lines 57-61 ----- | 16,17 |
| A | EP 0 621 648 A (C. UYEMURA & CO, LTD; UEMURA KOGYO KK) 26 October 1994 (1994-10-26) page 3, lines 50-54 ----- | 17 |
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| C.(Continuation) DOCUMENTS CONSIDERED TO BE RELEVANT | | |
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| Category * | Citation of document, with indication, where appropriate, of the relevant passages | Relevant to claim No. |
| Y | US 5 415 888 A (BANERJEE ET AL) 16 May 1995 (1995-05-16) column 5, lines 64-68 - column 6, lines 7-14 | 18 |
| Y | US 2002/055034 A1 (FUKUDA KAORU ET AL) 9 May 2002 (2002-05-09) page 2, paragraphs 27,33 | 18 |
| Y | US 6 475 249 B1 (HSU CHENG HSIEN ET AL) 5 November 2002 (2002-11-05) column 2, lines 54-57 - column 4, lines 11,12 | 19 |
| Y | US 2003/091890 A1 (FUKUDA KAORU ET AL) 15 May 2003 (2003-05-15) page 2, paragraph 24 - page 3, paragraph 25 | 19 |
| A | US 6 004 696 A (BARNETT ET AL) 21 December 1999 (1999-12-21) column 2, lines 50-59; figure 1 | 1-3,5,20 |

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ational application No.
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Box II Observations where certain claims were found unsearchable (Continuation of Item 2 of first sheet)

This International Search Report has not been established in respect of certain claims under Article 17(2)(a) for the following reasons:

1. ☐ Claims Nos.:
because they relate to subject matter not required to be searched by this Authority, namely:
2. ☐ Claims Nos.:
because they relate to parts of the International Application that do not comply with the prescribed requirements to such an extent that no meaningful International Search can be carried out, specifically:
3. ☐ Claims Nos.:
because they are dependent claims and are not drafted in accordance with the second and third sentences of Rule 6.4(a).

Box III Observations where unity of invention is lacking (Continuation of item 3 of first sheet)

This International Searching Authority found multiple inventions in this international application, as follows:

see additional sheet

1. ☒ As all required additional search fees were timely paid by the applicant, this International Search Report covers all searchable claims.
2. ☐ As all searchable claims could be searched without effort justifying an additional fee, this Authority did not invite payment of any additional fee.
3. ☐ As only some of the required additional search fees were timely paid by the applicant, this International Search Report covers only those claims for which fees were paid, specifically claims Nos.:
4. ☐ No required additional search fees were timely paid by the applicant. Consequently, this International Search Report is restricted to the invention first mentioned in the claims; it is covered by claims Nos.:

Remark on Protest

- ☐ The additional search fees were accompanied by the applicant's protest.
- ☒ No protest accompanied the payment of additional search fees.

FURTHER INFORMATION CONTINUED FROM PCT/ISA/ 210

This International Searching Authority found multiple (groups of) inventions in this international application, as follows:

1. claims: 1-3, 5 (partly), 20 (partly)

Claims 1-2 disclose a method of manufacturing a fuel cell by forming an electrolyte layer on an hydrogen permeable layer, forming a conductive layer having electrical conductivity on the electrolyte layer, to block off an electrical connection between the conductive layer and the hydrogen permeable layer via the pores present in the electrolyte layer.

Claims 3 and 5 disclose a method of forming said conductive layer by releasing a conductive material perpendicularly toward the electrolyte layer.

Claim 20 discloses a fuel cell manufactured according to claims 1-3 and 5.

2. claims: 4, 5 (partly), 20 (partly)

Claims 4-5 disclose a method of forming the conductive layer by releasing a conductive material toward the electrolyte layer at a specific angle.

Claim 20 discloses a fuel cell manufactured according to claims 4-5.

3. claims: 6-9, 20 (partly)

Claims 6-9 disclose a method of forming the conductive layer by first forming a dielectric layer in the pores present in the electrolyte layer, said dielectric layer being made mainly of an insulating material, before coating the electrolyte layer and the dielectric layer with the conductive layer.

Claim 20 discloses a fuel cell manufactured according to claims 6-9.

4. claims: 10-12, 20 (partly)

Claims 10-12 disclose a method of forming the conductive layer by first filling the pores present in the electrolyte layer with fine particles, forming the conductive layer on the electrolyte layer having the pores filled with the fine particles and removing the fine particles from the pores.

Claim 20 discloses a fuel cell manufactured according to claims 10-12.

5. claims: 13-15, 20 (partly)

FURTHER INFORMATION CONTINUED FROM PCT/ISA/ 210

Claims 13-15 disclose a method of forming the conductive layer by first forming a protective layer to cover the electrolyte layer before forming the conductive layer on the protective layer.

Claim 20 discloses a fuel cell manufactured according to claims 13-15.

6. claims: 16-17, 20 (partly)

Claims 16-17 disclose a method of forming the conductive layer by coating the electrolyte layer with particles of an electrically conductive material having a greater particle diameter than a width of the pores present in the electrolyte layer.

Claim 20 discloses a fuel cell manufactured according to claims 16-17.

7. claims: 18, 20 (partly)

Claim 18 discloses a method of forming the conductive layer by applying a paste, which contains an electrically conductive material and has a predetermined level of viscosity.

Claim 20 discloses a fuel cell manufactured according to claim 18.

8. claims: 19, 20 (partly)

Claim 19 discloses a method of forming the conductive layer by first forming a conductive film of an electrically conductive material before transferring said conductive film onto the electrolyte layer.

Claim 20 discloses a fuel cell manufactured according to claim 19.

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Information on patent family members

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